

Appln No. 09/627,572
Amdt date October 13, 2005
Reply to Office action of July 13, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for ~~[[of]]~~ operating a communications device to compensate for one or more potential impairments in a communication channel, each periodic in N timing phases thereof, wherein N is an integer, the method comprising:
receiving a sequence via the communication channel and estimating symbols thereof,
the sequence organized such that corresponding instances of one or more symbols of a predetermined set appear in each of the N phases;
grouping the N phases into one or more groups thereof based on a comparison of one or more amplitude estimates for each of the N phases with one or more estimates characteristic of the one or more groups ~~correspondence of respective estimates of the corresponding symbol instances~~; and
for each group, compensating for an aggregate effect of the impairments on the grouped phases ~~without identification of individual impairments active in the particular phases~~.
2. (Original) A method, as recited in claim 1, wherein the received sequence includes an impairment compensation sequence transmitted by a remote communications device.
3. (Original) A method, as recited in claim 1, wherein the received sequence includes a Digital Impairment Learning (DIL) sequence in accordance with ITU-T Recommendation V.90.
4. (Original) A method, as recited in claim 1, wherein the communications channel includes at least one portion susceptible to robbed bit signaling (RBS).

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5. (Original) A method, as recited in claim 1,
wherein the communications channel traverses a portion of a public switched
telecommunications network (PSTN) susceptible to the one or more potential
impairments each periodic in the N phases.

6. (Original) A method, as recited in claim 1, wherein $N = 24$.

Claim 7 (Canceled).

8. (Currently Amended) A method, as recited in claim 1, wherein the grouping based
on the comparison ~~correspondence~~ includes:

computing distance measures based on the respective estimates; and
selecting for inclusion in a particular group, those phases for which the computed
distance measures are less than a threshold.

9. (Original) A method, as recited in claim 8, wherein the distance measures are based
on comparison of respective estimates for plural symbols of the predetermined set thereof.

10. (Original) A method, as recited in claim 9, wherein the plural symbols correspond to
one or more Uchords.

11. (Original) A method, as recited in claim 1, wherein the compensating includes
training an adaptive structure for use in the grouped phases.

12. (Original) A method, as recited in claim 1, wherein the compensating includes
defining a constellation for use in the grouped phases.

13. (Original) A method, as recited in claim 1, wherein at least some of the potential

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impairments are not periodic in 6 timing phases.

14. (Currently Amended) In a communications system susceptible to one or more potential impairments, a method for [[of]] categorizing N phases of a received sequence of amplitude estimates according to impairments present therein, wherein N is an integer, the method comprising:

organizing the received amplitude estimates into the N phases, wherein N is selected such that each potential impairment, if present, is periodic therein; and
for each of the N phases, comparing one or more sets of amplitude estimates thereof to respective one or more sets of the amplitude estimates of other phases of the N phases to categorize the N phases into one or more groups according to similarity of the impairments, if any, present therein.

15. (Previously Presented) The method recited in claim 14 wherein the comparing includes:

calculating a difference measure between the one or more sets of amplitude estimates and a set of corresponding amplitude estimates in another phase; and
comparing the difference measure with a threshold.

16. (Original) The method recited in claim 15 wherein for a particular phase, the calculating and comparing includes:

determining a set of difference measures, each difference measure being a measure between the particular phase and another phase, the another phase representing an identified characteristic group of phases grouped according to similarity of impairments, if any;
finding a minimal difference measure from the set of difference measures;
if the minimal difference measure is less than the threshold, including the particular phase in the identified characteristic group; and

otherwise, defining the particular phase as a member of a new characteristic group.

17. (Original) The method recited in claim 15, wherein the difference measure is a determination between the set of amplitude estimates and the corresponding set of amplitude estimates, a result being squared and summed together.

18. (Original) The method recited in claim 15, wherein the set of amplitude estimates and the corresponding set of amplitude estimates each have two or more estimates of a same codeword within the respective phase, the two or more estimates of the codeword being averaged to increase accuracy.

19. (Original) The method recited in claim 16, wherein the particular phase is a first phase, the first phase being any one of the N phases, the first phase identifying a first characteristic group.

20. (Original) The method recited in claim 16, further comprising:
identifying at least one phase of the N phases as representing a characteristic group.

21. (Original) The method recited in claim 14,
wherein the potential impairments include at least one form of robbed-bit signaling (RBS).

22. (Original) The method recited in claim 14,
wherein the potential impairments include digital attenuation padding.

23. (Original) The method recited in claim 14, wherein N is 24.

24. (Original) The method recited in claim 14, wherein the impairments to which the

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communications channel is subject include robbed-hit signaling and padding impairments.

25. (Original) The method recited in claim 15, wherein the threshold is predetermined.

26. (Original) The method recited in claim 15, wherein the threshold is a function of distance measures between respective subsets of the amplitude estimates.

27. (Previously Presented) The method recited in claim 14, further comprising:
choosing the one or more sets of amplitude estimates for comparison according to power constraints.

28. (Original) The method recited in claim 16, further comprising:
for each identified characteristic group, averaging amplitude estimates, wherein groups of the amplitude estimates identify codewords, the averaging including:
identifying a plurality of corresponding codewords from each phase in the characteristic group; and
averaging the corresponding estimates for each codeword.

29. (Original) The method recited in claim 28, wherein the corresponding estimates of codewords include positive and negative estimates of codewords within a phase in the characteristic group.

30. (Original) The method recited in claim 28, wherein the codewords are PCM codewords.

31. (Original) The method recited in claim 15, wherein for a particular phase, the comparing includes:
comparing a measure between a set of amplitude estimates and another set of amplitude

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estimates of an identified characteristic group with a threshold;
if the difference measure is less than the threshold, including the particular phase in the
identified characteristic group;
otherwise repeating the comparing with a next set of amplitude estimates of a next
characteristic group; and
if no further characteristic groups are defined, defining the particular phase as a member
of a new characteristic group.

32. (Original) The method recited in claim 16, further comprising:
identifying at least one phase of the N phases as representing a characteristic group.

33. (Currently Amended) A communications device for a communications system
susceptible to one or more potential impairments each periodic in an integer number of symbols
transmitted across a channel, the communications device comprising:

a receiver for receiving a sequence of symbols transmitted across the channel, the
receiver producing a sequence of amplitude estimates; and
a digital impairment component to categorize N phases of the sequence of amplitude
estimates according to impairments present therein, wherein N is an integer, the
digital impairment component including:
an organize component to organize the received amplitude estimates into the N
phases, wherein N is selected such that each potential impairment, if
present, is periodic therein; and
for each of the N phases, a grouping component to compare one or more sets of
amplitude estimates thereof to a respective one or more sets of the
amplitude estimates of other phases of the N phases to categorize the N
phases into one or more groups according to similarity of impairments
present therein.

34. (Previously Presented) The communications device recited in claim 33 wherein the grouping component calculates a difference between the one or more sets of amplitude estimates and the respective one or more sets of the amplitude estimates of other phases of the N phases, and compares the difference with a threshold,

35. (Original) The communications device recited in claim 34 wherein for a particular phase:

the grouping component determines a set of difference measures, each difference measure being a measure between the particular phase and another phase, the another phase representing an identified characteristic group of phases grouped according to similarity of impairments, if any;

the grouping component finds a minimal difference measure from the set of difference measures;

if the minimal difference measure is less than the threshold, the grouping component includes the particular phase in the identified characteristic group; and

otherwise, the grouping component defines the particular phase as a member of a new characteristic group.

36. (Original) The communications device recited in claim 35 further comprising:

for each identified characteristic group, averaging amplitude estimates, wherein groups of the amplitude estimates identify codewords, the averaging including:

identifying a plurality of estimates corresponding to codewords from each phase in the characteristic group; and

averaging the corresponding estimates for each codeword.

37. (Original) The communications device recited in claim 36 wherein the corresponding estimates of codewords include positive and negative estimates of codewords

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within a phase in the characteristic group.

38. (Original) The communications device recited in claim 36 wherein the codewords are PCM codewords,

39. (Currently Amended) A computer program product comprising:
instructions executable on at least one processor to at least partially implement a
communications device; and
said instructions including a communication subset thereof executable to adapt the
communications device to establish communication across a channel susceptible
to one or more potential impairments each periodic in an integer number of
symbols transmitted across the channel, the instructions executable to cause the
communications device to:
receive a sequence of amplitude estimates;
organize the received amplitude estimates into the N phases, wherein N is an
integer and is selected such that each potential impairment, if present, is
periodic therein; and
for each of the N phases, compare a set of amplitude estimates thereof to a
respective one or more sets of the amplitude estimates of other phases of
the N phases to categorize the N phases into one or more groups
according to similarity of impairments present therein.

Claim 40 (Canceled).

41. (Currently Amended) An apparatus comprising:
a receive path coupled to receive sequences susceptible to one or more impairments
periodic in N phase intervals, wherein N is an integer; and
means for grouping the phase intervals into one or more groups based on a comparison

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of one or more amplitude estimates for each of the phase intervals with one or more estimates characteristic of the one or more groups according to apparent aggregate effect of the impairments thereon without identification of individual impairments active in the particular phases.

42. (New) The method of claim 1, wherein the compensating for the aggregate effect of the impairments is without identification of individual impairments active in the N phases.

43. (New) The apparatus of claim 41, wherein the means for grouping groups the phase intervals according to apparent aggregate effect of the impairments thereon without identification of individual impairments active in the phase intervals.